



Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Final Exam Examination, Summer 2020 @ DIU Blended Learning Center

Course Code: CSE122 (Day), Course Title: Programming & Problem Solving

Level: 1 Term: 2 Section: All

Instructor: SI Modality: Open Book Exam

Date: Wednesday- 25 August, 2020 Time: 09:00-01:00pm

Four hours (4:00) to support online open/case study based assessment Marks: 40

1. The following code generates errors. Why? How the code can be fixed. Provide the full corrected code. (1.5+1.5+2 = 5)

```
1. #include <stdio.h>
2. struct CarTypes
3. {
4.     int no_of_wheels;
5.     char model_name[30];
6.     float weight;
7. }Toyota, Ferrari;

8. typedef struct CarTypes CT;

9. int main() {
10.     Toyota.model_name = "Supra";
11.     Toyota.no_of_wheels = 4;
12.     Toyota.wieght = 580;

13.     CT mycar = Toyota;
14.     printf("%s\t%d\t%f\n",mycar.model_name,
15.           mycar.no_of_wheels, mycar.weight);
16.     return 0;
17. }
```

2. Write a full C Program for each of the following problems:

(4+5+5+6+7 = 27)

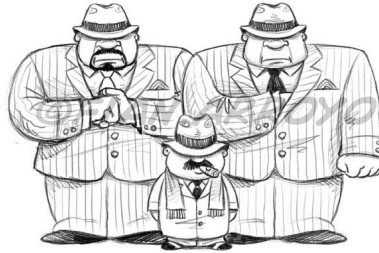


“ ঢাকা শহর আইসা, আমার আশা ফুরাইছে। আরে লাল লাল- নীল নীল বাতি দেইখ্যা নয়ন জুড়াইছে । ”

Have you listened to this song! It's one of the best songs of Bangla Cinema history. Well today we have **RUNU** and **JHUNU** with us from a distant village of Bangladesh who came to this



Dhaka city for the first time. Both of them are very good with some unique abilities. But their calculating & coding abilities are a little bit poor. Well not to worry. We have you.



a) **RUNU JHUNU** has a special bag of money which gives them money every morning when they wake up from sleep. Somehow they figured out how much money each day they will be able to get from the magic bag in the next **N** days. So, now they want your help to decide where to eat in this Dhaka city. Well for your help they also provided the list below:

- Roadside Food if the amount is 100 or less
- Fast Food if the amount is 250 or above but less than 350
- Kacchi if the amount is 350 or above
- Otherwise in BSC



Input: An integer **N** (No. of days). Followed by an integer in the next N line defining the amount of each of the N days.

Output: “Roadside Food”, “Fast Food”, “Kacchi” or “BSC” depending on the amount of each day.

Sample Input	Sample Output
3	Kacchi
999	Roadside
9	Fast Food
282	

b) **RUNU JHUNU** was travelling the city and some goons found them and thought they were easy prey. So, they kidnapped them and brought them to a newly constructing building where the staircase was not made yet. The goons took them to the top floor using a temporary lift which is only operable from down and put them inside a locked



room. Then the goons left to search for new prey. Now **RUNU JHUNU** used one of their special skills and summoned a book and a magical key to unlock any room. Where there were a **lot of repeated numbers from 2 to 99999**. It was also written that if any number's count in that book is a prime number (A prime number is a number which is only divisible by 1 and itself) then **RUNU JHUNU** will be able to build a staircase. But they need to build at least seven stairs to escape from that building. **RUNU JHUNU** knows how many numbers **M** are there in the book. But they don't know the number of stairs they can build. You have to help **RUNU JHUNU** before the goons are back. If **RUNU JHUNU** can not escape using the current book then you have to tell them to "**Hurry! Summon another book**". Otherwise just let them know the number of stairs they can create using the current book.

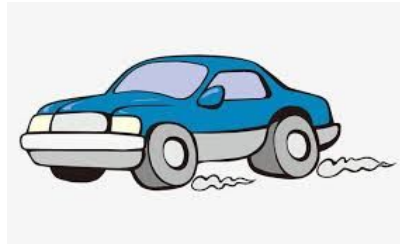


Input: An integer **T** (No. of test cases). Then for each **T** a **M** (the number of integer values inside the book) followed by **M** integers in the next line. **Consider 1 as a prime number.**

Output: The number stairs possible to create from the book to escape from the building in a line or "**Hurry! Summon another book**".

Sample Input	Sample Output
2 9 1 2 3 4 5 6 7 2 2 9 1 2 3 4 5 6 6 2 3	7 Hurry! Summon another book

- c) Well somehow **RUNU JHUNU** are down but they do not know which way to go. So they decided to call upon another magic book. This time the magic book provided them **M** capital characters without any space in between. It was said that if they can find "**MAGICCAR**" as subsequence from the given characters then a magic car will come to them and help them to flee. Your job is to help them to decide. Should they wait for the magic car or should they run.



Input: An integer **M** (the number of characters inside the book) followed by M characters in the next line.

Output: A line saying either “**Wait! Magic car is coming**” or “**Run! RUn! RuN!**”.

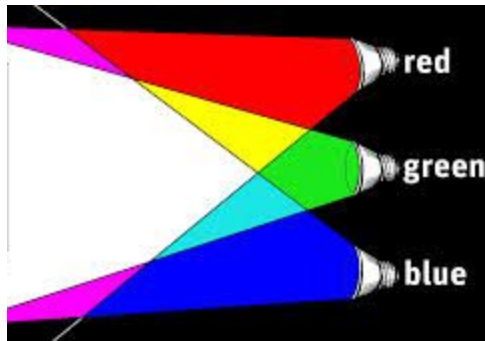
Sample Input 1	Sample Output 1
17 AMBCAGIDFRCAFCAR	Wait! Magic car is coming

Sample Input 2	Sample Output 2
17 AMBCAGIDFRCAFAR	Run! RUn! RuN!

- d) **RUNU JHUNU** watched the news today where they found that every day some goons are killing innocent people who come to visit Dhaka City. So they decided that they will build traps at all of the goons' hideouts. A team of goons hides in a **MxM** building where M defines the number of floors, also the number of rooms in each floor. All the rooms in the floor are attached to one another and one can represent the building in a 2D matrix. From their magic book of traps **RUNU JHUNU** found that to instantly kill the goons in a room they have to color it with **Red**. To kill them slowly with poison they have to color it with **Blue**. But there is a third color that is **Green** which will not be able to kill anyone. As killing someone is not that easy, **RUNU JHUNU** has now received complicated steps to set the traps so that they can kill the Goons. Initially the rooms had no color. They have to start from a random room **(a,b)** where both a & b is less than M. Here a is the number of Floor and b is the number of rooms. The room they are in is of red color, as they want to kill the goons instantly. From there they have to set the trap in the top & bottom floors' room which is connected with their room, also left and right room of that same floor if there are any. But they can use only blue color if the room is already not colored. If any of these rooms is already colored then they have to color it with Green. Now your job is to color all the rooms such that the Red and Blue color is maximized and the Green color is minimized. But you can start coloring the top, left, right and left room if and only if you have at least 1 uncolored room in any of these four positions. Also you are not allowed to color the four rooms from any of the green or uncolored boxes. Your job is to define

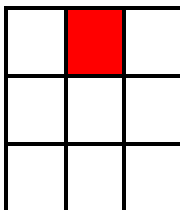


how many of each colors' boxes are there after you are done coloring them all. You will have only **M a b** as input. You can output any if there is more then one output.

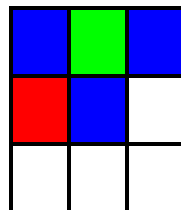


Sample Input	Sample Output
3 1 2	Green color box = 2 Red color box = 2 Blue color box = 5

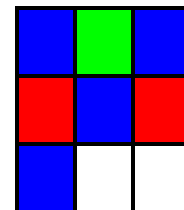
Explanation:



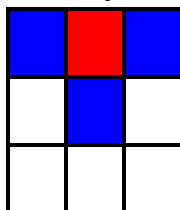
Step 1



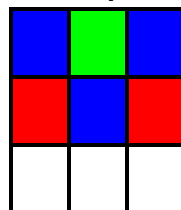
Step 3



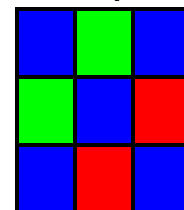
Step 5



Step 2



Step 4



Step 6

e) Solve the above problem using recursion.

3. Write a summary of your thoughts about this Course. Be sure sure to mention the following:

(2x4 = 8)

- Why do you think this course is important?
- What do you think is lacking in this course?
- Do you believe that C language was a good choice to teach you in this course as the world is buzzing with python or other more recent and popular languages?
- If you were the course teacher what would have you done differently in this course